METAMORPHIC ROCKS OF UNCERTAIN AGE

Mississippian and older

Summary of mineral resource potentia

Part of a major mineral belt of Alaska, the

sulfide resources delineated, additional

Eastward extension of tract A. Relatively

untested area, but available evidence

suggests less likelihood of substantial

Particularly favorable environment for

felsic plutonic deposits as attested by

widespread, strong geochemical anomalies

and by numerous small known deposits.

Several mineral deposits and geochemical

anomalies at surface suggest undiscovered

deposits at depth in or above the upper

part of a buried granite body.

Several small deposits and widespread

adjacent to granite are favorable for

discovery of additional deposits.

geochemical anomalies indicate that areas

Scattered mineral deposits and geochemical

anomalies suggest the tract is underlain

by a buried granite pluton similar to the exposed plutons to the north. Additional

deposits likely in upper part of this buried

granite pluton or in the metasedimentary

geochemical anomalies, and circular patterns

a buried granite pluton. Apex of pluton is

of arcuate features on satellite images suggest

A few small mineral deposits, scattered

probably centered below tract G.

Several indications of mineral resources

strong or widespread.

within the tract; evidence not particularly

Small galena prospect in skarn associated with one of

two small granite bodies; subsurface extension

favorable environment for additional deposits.

of granite, perhaps at depth to the west, is

Geochemical anomalies and known deposits

at surface strongly suggest a buried granite

pluton with additional deposits at depth.

particularly in upper part of the pluton

Geochemical anomalies and known deposits

pluton with additional deposits at depth,

particularly in upper part of the pluton

Some potential for discovery of substantial

Limited evidence suggests some potential for stratiform Pb-Zn-Ba deposits

similar to Red Dog deposit, west-

northwest of the quadrangle.

mineral deposits, but no strong or persuasive

at surface strongly suggest a buried granite

or just above it.

or just above it.

rocks above it.

massive-sulfide deposits than in tract A

Ambler district. Large high-grade massive-

Constraints on location of

Geology complex, deposits not always

obvious at surface. Much of tract

at depth largely untested.

Same as tract A but no major

volcanogenic massive-sulfide deposits

or metarhyolites are known compared

Most deposits in or adjacent to border of

Devonian granite pluton. Favorable

Extension of tract C assumes that

granite pluton extends under tract

Additional deposits likely near granite-

near vertical contact of granite that

metasedimentary rocks contact, especially

wraps around north end of Arrigetch Peaks

and in shallowly dipping metasedimentary

rocks that cap the northeast lobe of the

Relies on the contact of a buried granite

pluton with metasedimentary rocks.

The undiscovered deposits will likely be

Most favorable environment in upper part

of a possible buried pluton and the

metasedimentary rocks above it.

Dependent on existence of a possible

Potential probably lies in sub-surface

Related to a possible buried granite

Related to a possible buried granite

Insufficient data to predict

pluton at considerable depth; pluton

may be displaced by thrust faulting.

pluton at considerable depth; pluton

may be displaced by thrust faulting.

exposed at the surface.

extension of two small granite bodies

buried felsic pluton.

Mount Igikpak pluton.

at considerable depth.

metasedimentary rocks cap the pluton

as isolated erosional remnants south of the

north of the Noatak River and are preserved

covered by surficial material, potential

additional deposits

**CORRELATION OF MAP UNITS** 

MAINLY METAMORPHOSED MAFIC IGNEOUS ROCKS

OF UNCERTAIN AGE

Table 1. Summary of tracts with mineral resource potential, Survey Pass Quadrangle, Brooks Range, Alaska

Geology: Tract limited to Paleozoic

known widely in tract.

suite of elements.

Landsat: Not diagnostic.

sulfide deposits are known.

Aeromagnetics: Not diagnostic. Landsat: Not diagnostic.

dispersed and weaker.

to north of it. Landsat: Not diagnostic.

Geochemistry: Numerous strong

anomalies in a characteristic

schist unit (Pzs); known deposits

closely related to metarhyolites (Df

Volcanogenic massive-sulfide deposits

Aeromagnetics: Pattern more complex than can be explained by surface geology.

Geology: Extension of tract A along schis

Geochemistry: Same suite of elements

belt (unit Pzs). Several probable massive

as in tract A but anomalies more widely

Geology: Tract controlled by periphery of

Geochemistry: Strong, persistent anomalies in

Aeromagnetics: Suggests that exposed pluton

south of the Noatak River persists at depths

Geology: Inference that pluton of tract C

Geochemistry: Widespread anomalies in suite of

elements characteristic of felsic-plutonic

deposits, anomalies somewhat less intense

Aeromagnetics: Permissive that granite pluton

extends below this tract at depth.

and more diffuse than in tract C.

Geology: Common occurrence of small,

erratic mineral deposits near granite-

Geology: Surrounding geology and of

Geology: Surface geology not diagnostic.

to those over known felsic plutons.

Geochemistry: Several anomalies in Ag.

Landsat: Circular patterns of arcuate features

Geology: Exposures of granite and a known prospect

Geochemistry: Anomalies masked by more extensive

Geochemistry: Widespread anomalies in Pb, Zn, Cu,

Aeromagnetics: Permissive suggestive of a buried granite pluton.

Landsat: Well-developed circular pattern of arcuate features

analogous to those over exposed granite plutons in the

Geochemistry: Widespread anomalies in combinations

of Pb, Zn, Cu, Mo, Ba, Be, Bi, B, La, and Th;

somewhat stronger and more persistent in tract L

Aeromagnetics: Permissive of a buried granite pluton.

analogous to those over exposed granite plutons in

Geochemistry: Scattered anomalies in Pb, Zn, Ba, or Ag.

Geochemistry: Scattered anomalies in combinations of

Landsat: Circular pattern of arcuate features centered on tracts

Aeromagnetics: Suggests that plutons exposed at surface

analogous to those over known granite

extend to the west in the subsurface.

Aeromagnetics: Not diagnostic.

Geochemistry: Widespread anomalies in poly-

Geochemistry: Widespread, if not especially strong

Aeromagnetics: Permissive of a buried granite pluton.

Geochemistry: Several anomalies in Ba, Zn, Mo, and

Aeromagnetics: A low over tract G is permissive of a

Landsat: Circular patterns of arcuate features analogous

in tract H may reflect a contact-metamorphic

buried felsic pluton; an area of highs that wraps around it

anomalies in a suite of elements characteristic

metallic felsic-plutonic suite of elements.

metasedimentary rocks contact.

Aeromagnetics: Not diagnostic.

of felsic-plutonic deposits.

Ag suggest a buried pluton.

Geology: Not diagnostic.

plutons in quadrangle.

Landsat: Not diagnostic.

Geology: Not diagnostic.

Geology: Not diagnostic.

than in tract M.

Geology: Not diagnostic.

Landsat: Not diagnostic.

Mississippian rocks.

Landsat: Not diagnostic.

Aeromagnetics: Not diagnostic.

Pb, Zn, and Ba.

Aeromagnetics: Not diagnostic.

Geology: Tracts defined by exposures of

Ag, Sn, W. La, and Th.

Landsat: Not diagnostic.

Landsat: Not diagnostic.

known deposits.

extends under tract.

Landsat: Not diagnostic.

a felsic-plutonic suite of elements over most

PALEOZOIC

METAMORPHOSED

IGNEOUS ROCKS

DEVONIAN (?

PRECAMBRIAN (?

Considerable drilling and

No drilling; cursory or

Cursory, mostly before 1971.

Cursory, mostly before 1971.

None or cursory......

Some drilling on Pb-Zn-Cu-

detail in recent years.

No drilling. Probably

Probably none (deposits not

previously known).

Ag prospect; at least part

detailed surface mapping

UNMETAMORPHOSED TO LOW-GRADE

METAMORPHOSED SEDIMENTARY ROCKS

Devonian

Dp Upper and Middle Devonian

Type of deposit

felsic pluton.

Associated with

F Associated with

G and H Associated with

I Uncertain.

K Associated with

L and M Associated with

Indeterminate, but

several possibilities.

felsic pluton.

felsic pluton.

felsic pluton.

A Volcanogenic Cu-Zn-Pb Several well-defined

Volcanogenic Cu-Zn-Pb Few small occurrences,

deposits known; one

large (Sun). A

world-class deposit

extension of tract.

Numerous small and

erratic quartz veins,

deposits involving

Bi, As, F, and Mo.

Several small deposits

mostly quartz veins

with combinations of

Cu, Zn, Au, Ag, Sb,

and Mo.

Several small skarn,

Several small quartz

veins and skarns.

Few small deposits of

indeterminate type

Two small deposits,

marble.

Small Ag-bearing

galena prospect in

Several small quartz

Several small

occurrences of

uncertain type,

including various combinations of Cu.

Pb, Zn, Ag, Sb, and

veins, lenses, and

brecciated zones with

sphalerite, galena, and

a massive-sulfide

copper prospect and a

Pb-Zn-Cu-Ag deposit in

involving combinations

of Ag, Cu, Zn, As, and

vein, or replacement

deposits occur at or near granite-

metasedimentary rock/contact.

skarns, and replacement

of Cu, Pb, An, Fe, Sn, Be,

(Arctic) is just to west of quadrangle along

CRETACEOUS

MISSISSIPPIAN

p€gr

No production. About

\$2.0 billion in high-

by drilling at Sun

grade resources defined since early 1970's.

TRIASSIC PERMIAN

Probable potential--Type of deposit(s) known or can be confidently inferred; may or may not contain substantial number of known deposits. Definition of tract and its mineral resources may require some speculation or interpretation of subsurface geology

> Weak or limited evidence of potential--Commonly certain few known deposits that may not be possible to classify type of deposits; boundaries usually highly subjective

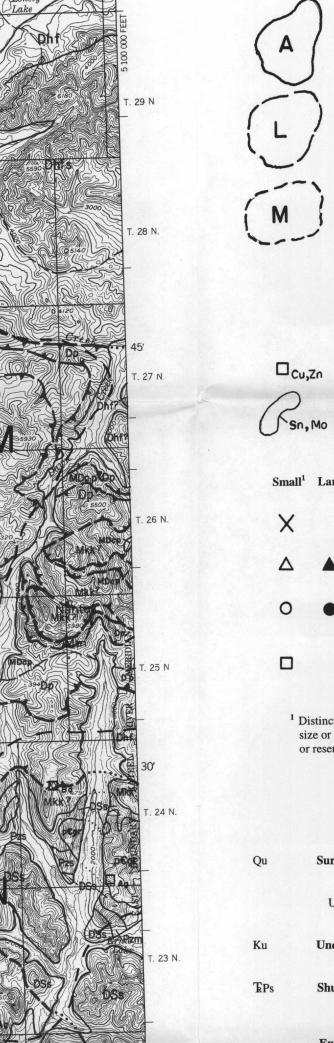
on this map duplicate those on that map Mineral deposit--Showing type, size, and significant elements or commodities

Mineral deposits--Described in detail in Grybeck and Nelson (1981b). Symbols

Pervasively mineralized area--Showing significant elements or commodities

metamorphosed to unmetamorphosed Mafic volcanic and intrusive rocks--Basalt, greenstone, and altered gabbro.

Thrust fault--Dashed where approximately located or inferred; dotted where concealed; queried where uncertain. Sawteeth on upper plate



Stratiform volcanogenic Cu-Zn-Pb-Ag deposit Polymetallic contact-metamorphic deposit associated with Deposits other than those characterized above or of unknown type <sup>1</sup> Distinction between large and small deposits is subjective. Small deposits are those of limited size or apparently limited size. Large deposits are those having substantial mineral resources or reserves or those that have been extensively explored. **DESCRIPTION OF MAP UNITS** UNCONSOLIDATED DEPOSITS Surficial deposits, undivided UNMETAMORPHOSED TO LOW-GRADE METAMORPHOSED SEDIMENTARY ROCKS Undivided conglomerate--Quartz-pebble and igneous-pebble congomerate; some interbedded volcanic sandstone Shublik and Siksikpuk Formations (Triassic and Permian)--Pink-weathering limestone of Shublik Formation (Triassic) and black slate and chert of Siksikpuk Formation (Permian) Endicott Group (Mississippian and Devonian)--In map area includes: Kayak Shale and Kekiktuk Conglomerate (Lower Mississippian)--As mapped, unit includes related undifferentiated clastic rocks and a few outcrops of limestone in lower (?) part of Lisburne Group Kanayut Conglomerate (Upper Devonian)--Non-marine rusty-weathering quartz sandstone, ferruginous mudstone, and black siltstone, and shale. Prominent resistant layers of black-lichen-covered light-gray quartzite. Rare Hunt Fork Shale (Upper Devonian)--Dark-gray phyllite with minor quartz mudstone and sandstone. Upper part includes: Wacke sandstone member (Upper Devonian)--Thick monotonous unit of interbedded rusty-weathering, feldspathic sandstone and dark-gray mudstone and shale. Locally includes thin layers of reddish-gray fossiliferous limestone and calcareous sandstone Gray phyllite--Mainly gray, calcareous phyllite and muscovite schist; contains limestone beds up to 20 m thick. Locally consists of lenses of quartz-pebble conglomerate interbedded with orange-weathering, fossiliferous limestone, black siliceous phyllite, or micaceous schist Skajit Limestone (Devonian and Silurian)--Massive white to light-gray granoblastic marble and orange-weathering dolomitic marble. Some interlayered chlorite schist METAMORPHOSED IGNEOUS ROCKS Gneissic granite--Medium- to coarse-grained biotite-muscovite orthogneiss ranging in composition from granite to alkali-feldspar granite. Commonly welldeveloped augens; locally cataclastically deformed Metafelsite--Mainly quartz-albite-feldspar schist; locally porphyroblastic muscovite-biotite-quartz-albite-feldspar rocks that retain igneous textures Granitic schist--Medium-grained porphyroblastic gray biotite-quartz-feldspar MAINLY METAMORPHIC MAFIC IGNEOUS ROCKS OF UNCERTAIN AGE Mafic volcanic rocks, phyllite, sandstone, and chert--Consists mainly of interbeds and fault slivers of Devonian((?) to Jurassic pillow basalt, greenstone, and diabase, gray phyllite, wacke sandstone, minor Triassic radiolarian chert, Mississippian radiolarian chert, and thin beds of Paleozoic limestone. Weakly Unmetamorphosed to slightly metamorphosed METAMORPHIC ROCKS OF UNCERTAIN AGE Calcareous phyllite--Black calcareous phyllite with thin dark-gray limestone lenses Low-grade schist--Chlorotoid-bearing quartz-muscovite schist, calcareous quartzalbite-muscovite schist, quartzite, and rare thin limestone beds. Schist locally contains glaucophone Chloritic quartzite--Chlorite quartzite and chloritic quartz schist Low- to medium-grade schist and gneiss--Interlayered quartz-muscovite schists and orange-weathering marble. Medium-grade schist and paragneiss with garnet, biotite, and amphibole near plutons Contact--Dashed where approximately located; dotted where concealed **Fault**--Dashed where approximately located or inferred; dotted where concealed; queried where uncertain

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## MINERAL RESOURCE POTENTIAL MAP OF THE SURVEY PASS QUADRANGLE, BROOKS RANGE, ALASKA

NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

Donald J. Grybeck, Steven W. Nelson, John B. Cathrall, John W. Cady, and James R. Le Compte